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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/676,643	10/01/2003	Wan Shick Kim	SUN-DA-106T	1719

23557 7590 06/02/2006

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EXAMINER

MULLER, BRYAN R

ART UNIT	PAPER NUMBER
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3723

DATE MAILED: 06/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/676,643

Applicant(s)

KIM, WAN SHICK

Examiner

Bryan R. Muller

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,3 and 5-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2,3 and 5-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The amendment filed 3/16/2006 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material, which is not supported by the original disclosure, is as follows: the diluent is pure water or "a solution with substantially the same **ingredient** as the slurry solution". The original specification disclosed that the solution has substantially the same composition as the slurry, wherein the definition of composition is "the qualitative and quantitative makeup of a chemical compound¹". Thus, the original specification discloses that the diluent solution is either water or a solution having the same ingredients in the same proportions as the slurry solution. The new matter, disclosing that the diluent solution only has the same ingredient as the slurry solution, therefore will broaden the scope of the invention by disclosing that the diluent solution will have at least one of the same ingredients as the slurry solution but does not necessarily have all of the same ingredients or have the ingredients in the same proportions.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the

¹ *Merriam-Webster's Collegiate® Dictionary, Tenth Edition*
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art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 3 and 6 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. As discussed supra, the amendment to claim that the diluent solution has the same ingredient as the slurry solution is not supported by the original specification and would serve to broaden the scope of the claim.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 3 and 6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The disclosure that the diluent solution is a solution with the same **ingredient** as the slurry solution is unclear. It is unclear if the applicant is intending to claim that the diluent solution has all of the same ingredients as the slurry solution or if the diluent solution merely has **at least** one of the same ingredients. In the case that the applicant is intending to claim that the diluent solution merely has **at least** one of the same ingredients, it is further unclear, which ingredient(s) are common to the diluent solution and the slurry solution. Because the term "solution" defines more than one ingredient, it is unclear what ingredient(s) both the diluent solution and the slurry solution have in common.

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6. Claims 7 and 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims disclose the amount

7. Claims 9 and 10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Firstly, the applicant claims that the slurry in the slurry supply line is different than the supplied slurry. Due to the bypass that provides a diluent solution, the density and amount of particles in the slurry that is in the slurry supply line is different at different points along the slurry supply line (i.e. the slurry in the slurry supply line that is immediately adjacent to the nozzle will inherently be the same as the supplied slurry whereas the slurry that is in the slurry supply line at a point prior to the by-pass will inherently be more dense and have more particles because it has not been provided with the additional diluent solution from the by-pass). Secondly, both claims appear to be comparing different units of measure. Claim 9, compares density (quantity per unit measure) of a slurry to amount (volume or mass) of a supplied slurry and claim 10 compares amount of particles (quantitative value) in a slurry to amount of a supplied slurry (volume or mass). It is unclear how these values can be inversely proportional to one another, respectively, when they are dealing with different units of measure.

Claim Rejections - 35 USC § 103

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8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 2, 3 and 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo et al (2002/0061722) in view of Grant et al (2003/0174306).

10. In reference to claim 2, Kondo discloses an apparatus to control slurry flow in a chemical mechanical polishing apparatus for planarizing an object to be polished by supplying slurry on a grinding pad through a slurry injection conduit, the apparatus comprising a slurry supply unit (10-3 and 42) to supply slurry to the slurry injection conduit (57) through a slurry supply line (56), a by-pass (561) diverged from the slurry line, a photo image sensor (7) to detect a generally cross-sectional image of the slurry flowing in the by-pass, a slurry measuring unit (arithmetic processing unit; paragraph 48) to analyze the image captured by the photo image sensor to measure the sizes of particles included in the slurry and the density of the slurry, a slurry flow control unit (10) to control the slurry supply unit based upon the particle sizes and the slurry density measured by the slurry measuring unit. Kondo also discloses that it is difficult to measure abrasive grains in some circumstances when a large amount of larger sized abrasive grains are present in the slurry (paragraph 3, lines 19-25). However, Kondo fails to specifically disclose a slurry injection nozzle, but does disclose that the slurry is supplied to the work piece of a CMP tool, and it is commonly known in the art that a nozzle may be used to supply slurry to a work piece accurately during the CMP

process. Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to provide a nozzle to supply the slurry to the substrate in order to control the slurry and make application of the slurry more accurate. Kondo also fails to disclose that a diluent solution supply unit to supply diluent solution into the by-pass to reduce a concentration of particles in the slurry. Grant discloses a similar slurry control unit for monitoring and controlling slurry density and flow and teaches that when using optical particle sensors, similar to those used by Kondo, to detect size and quantity of particles in slurry, the slurry must be diluted enough so that only one detectable particle passes through the light beam at a time (paragraph 11). Therefore, it would have been obvious, in view of the disclosures of Kondo and Grant, to one of ordinary skill in the art at the time the invention was made to provide a means to further dilute the slurry solution prior to passing through the sensors to ensure that the sensors can obtain accurate readings. It would further have been obvious that the means to further dilute the slurry solution will be a diluent solution supply unit and to provide the diluent solution supply unit directly to the by-pass prior to the sensor(s). It would have been obvious to provide the diluent solution supply unit directly to the by-pass because a smaller amount of diluent solution would need to be added to the slurry solution in the by-pass than would need to be added to the slurry solution in the slurry supply line to sufficiently dilute the slurry solution that is passing through the sensor to desired amount. Supplying the smaller amount of diluent solution to the slurry in the by-pass will reduce expense of providing the diluent solution and will also serve to better maintain the

desired composition of the slurry that is in the slurry supply line that is delivered to the injection nozzles by minimizing the additional diluent added to the entire system.

11. In reference to claim 3, Kondo discloses that the diluent for the original slurry production is pure water (abstract, lines 1-3) and Grant further discloses that the diluent can be several different types of water including pure water or water with pH adjusted to that of the slurry sample (paragraph 11). Thus, it further would have been obvious that the diluent solution provided to the by-pass could be pure water, as taught by Kondo and Grant, or water with an adjusted pH, as taught by Grant. Thus, the diluent solution is pure water or a solution of pure water and a pH adjuster, which is a solution with the same, pure water, ingredient as the slurry.

12. In reference to claim 5, The obvious combination of Kondo and Grant would provide a method to control slurry flow in a chemical mechanical polishing apparatus for planarizing an object to be polished by supplying slurry on a grinding pad through a slurry injection nozzle, the method comprising supplying slurry to the slurry injection nozzle through a slurry supply line, introducing slurry into a by-pass diverged from the slurry supply line, supplying a diluent solution into the by-pass to reduce a concentration of particles of the slurry, capturing a cross-sectional image of the by-pass to measure the sizes of particles included in the slurry and the density of the slurry and controlling supply of the slurry based upon the measured sizes of particles and density of slurry.

13. In reference to claim 6, the diluent solution may be a solution with the same ingredient (pure water) as the slurry solution.

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14. In reference to claim 7, it would be obvious that the density of the slurry supplied to the slurry injection nozzle would be higher than a density of the diluent solution because the slurry supplied to the slurry injection nozzle will have abrasive particles in pure water, where as the diluent solution is only pure water or water with a pH adjuster and because the abrasive particles are made of solid material, it would further be obvious that the abrasive grains have a higher density than the pure water or water with a pH adjuster and would thus, make the slurry solution of pure water and abrasive grains have a higher density than the diluent solution.

15. In reference to claim 8, it would further be obvious that the amount of particles in the slurry supplied to the slurry injection nozzle will be higher than the amount of particles in the supplied diluent solution because the supplied diluent solution does not have any particles in it.

16. In reference to claim 9 and 10, as discussed supra, it is unclear how two values of different units of measure or different properties may be proportionally related to one another. In this situation, a claim which fails to comply with the first and/or second paragraph of §112 will not be analyzed as to whether it is patentable over the prior art since to do so would of necessity require speculation with regard to the metes and bounds of the claimed subject matter, **In re Steele**, 308 F.2d 859, 862-63, 134 USPQ 292, (CCPA 1962) and **In re Wilson**, 424 F.2d 1382, 1385, 496 USPQ 494, 496 (CCPA 1970).

Response to Arguments

17. Applicant's arguments, see Remarks, filed 3/16/2006, with respect to the rejection(s) of claim(s) 2, 3 and 5-10 under 35 U.S.C. 103(a) in view of Farkas, Cerni and Kondo have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Kondo and Grant.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Farkas et al (5,710,069) discloses an apparatus for monitoring and controlling slurry using a photo image sensor, Cerni et al (6,275,290) discloses an apparatus for monitoring and controlling slurry that comprises a by-pass with a photo image sensor to detect a cross-sectional image of the slurry in the by-pass, Kilham (5,191,388) discloses a photo image sensor apparatus for analyzing particulate matter in slurry flow, Choi et al. (2003-036970) discloses a method for measuring density and particle size in a slurry using ultraviolet light, Lawton (6,347,976) discloses a common CMP system the uses sensors to determine operating properties of the system to control the system and uses a nozzle to supply the slurry to the substrate.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bryan R. Muller whose telephone number is (571) 272-

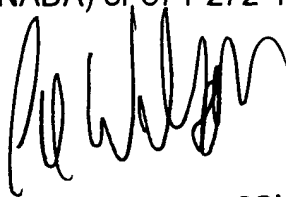
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4489. The examiner can normally be reached on Monday thru Thursday and second Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph J. Hail III can be reached on (571) 272-4485. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BRM BRM
5/24/2006



LEE D. WILSON
PRIMARY EXAMINER